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Occurs from New Hampshire westward through New York and Canada to Michigan and Colorado.

**A. longula** Lec.

Narrower and more elongate than the other species, and with the thorax more narrowed in front. The hind angles of the thorax are rectangular, and the oblique impression of the disc very indistinct. The sides of the body beneath are coarsely, but sparsely punctate.

Occurs on the Pacific coast from Washington southward to San Diego.

**A. scitula** Zimm.

Broader than *longula*, and with the sides of the thorax more arcuate. The hind angles of the thorax are less sharply rectangular, and the oblique impression entirely wanting. The body beneath is obsoletely punctate at the sides. The femora are always piceous and more or less metallic, the tibiæ and tarsi paler, but never rufo-testaceous.

Occurs from Washington to San Diego.

**A. Belfragei** n. sp.—Oval, piceous moderately shining, surface faintly bronzed. Antennæ entirely rufo-testaceous. Thorax half wider than long, sides arcuately narrowed to the front, hind angles slightly obtuse, surface smooth and shining, impunctate, basal region with extremely vague traces of impressions. Elytra finely striate, more deeply at apex. lateral striæ, sixth and seventh, almost obliterated. Body beneath piceous, smooth, shining, slightly metallic, epipleuræ a little paler. Legs rufo-testaceous. Length .32—.34 inch.; 8—8.5 mm.

This species very closely resembles *impuncticollis*, but may be known by the form of the spur of front tibia. It is more oval than any species of the *Triæna* series, and differs from them all by the entirely pale antennæ.

Collected by Belfrage at Waco, Texas.

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**A study of AMARÆ s. g. CELIA.**

BY GEO. H. HORN, M. D.

The division or sub-genus *Celia* was first proposed by Zimmermann for those *Amaræ* in which, with a thorax broad at base, the posterior tibiæ of the males are not pubescent on the inner side. The memoir by Zimmermann was published in the first volume of Gistel's Faunus, 1832, and two years later a French translation appeared in the second volume of Silbermann's Revue. These two works are practically inaccessible to the vast majority of American students, and very few libraries contain either work.

The species of our fauna have been studied by Dr. LeConte in the Ann. Lyc. iv, and later Proc. Acad. 1855. In the latter essay the main divisions of *Amara* have been given, but, unfortunately in the specific work, no reference is made to the many important characters discovered by Zimmermann. At this point it might be mentioned that LeConte did not accept the divisions of *Amara* as valid genera, although many of them have been by other students. As late as the "Catalogus," *Celia* is retained as distinct, but it is difficult to understand why *Triæna*, with a sharply defined structural character in *both* sexes, should be suppressed and *Celia* retained with a very shadowy line of demarcation in one sex alone.

The latest considerable study of *Amara* is by M. Putzeys, in the Mem. Liege 1866, based almost entirely on the collection of Baron Chaudoir. In this essay the author seems to have followed rather closely the lines of Zimmermann with but little variation.

In the pages which follow the same general plan has been adopted with some modifications which have seemed desirable, or which are made necessary by material unknown to either Putzeys or Zimmermann.

*Celia* in the present essay will include *Percosia* and *Acrodon*, two other genera suggested by Zimmermann.

*Percosia* was separated by having the three dilated joints of the front tarsi of the male broad and cordiform, while in *Celia* they are said to be elongate and cordiform. As far as our species represent these divisions, there is no appreciable difference between them.

*Acrodon*, with all the essential characters of *Celia*, differs in having a simple mentum tooth, bifid in nearly all other *Amaræ*. Putzeys has observed in *Amathites* a tendency to vary the form of the acute tooth, and some of our species of *Celia*, notably *rectangula*, have the tooth very nearly acute at tip.

In his division of *Celia*, as restricted by him, Zimmermann proposes nine groups, the first two of which are separated from the others by having the hind tibiæ of the males slightly pubescent within. For this reason I have said that the differences between *Celia* and *Amara proper* are rather shadowy.

The first character, however, made use of in separating the groups, is based on the presence of a group of small punctures, or of a punctured fovea in the middle of the prosternum of the male in seven of the groups, and the absence of such structure in two others. From a study of our species this character, although of great value, must

be made subordinate to another. In all of our species with the antennæ and legs piceous-black, forming the group *erratica* of the present essay, the group of punctures is at best very indistinct, and in many specimens entirely wanting, for which reasons it would be very misleading to use this structure in a table before removing any troublesome elements by other means. The color of the antennæ and legs, although apparently trivial, is constant and unmistakable, and separates sharply an otherwise troublesome series.

In all the groups which follow there can be no mistake when a male is examined, the group of punctures may be indistinct, but is always present.

At the tip of the prosternum in all our species there is a marginal line variable in distinctness. The point of the prosternum may be entirely simple as in the majority of the species; in those of the *obesa* group there are numerous punctures in the marginal line, varying from three to five on each side, each puncture bearing a short, stiff bristle or seta, while in the species of the *remotestriata* group there is but one seta each side. In looking for this character care must be taken that the setæ on the trochanters do not lead to deception.

In the *remotestriata* group the sides of the thorax are slightly depa-nate, likewise in the *obesa* group. The character is not very striking, but when once appreciated, will enable the females of the allied forms of different groups to be separated.

At times great importance has been attached to the foveæ at the base of the thorax, and the sculpture, whether punctured or not, but these have been found to have very little value.

In several species the two sexes differ notably in the character of the surface, the males being smooth and shining, the females dull. The scutellar stria varies in distinctness and extent. In many species it arises at the base of the second stria, and joins, by its apex, the first stria; in this case it is called entire. There are some species in which the scutellar stria is practically always free at its apex, but exceptions occur in both forms. In no *Celia* in our series has there been observed an ocellate fovea at the base of the scutellar stria as is universal in *Triena*, and of frequent occurrence in *Amara*.

In the majority of our species the under side of the body is smooth, a small number have the sides of the metasternum and the episterna punctate, the punctures extending to the sides of the ventral segments.

As a sexual character of minor importance the anal setæ have some value. In some species the male will have one seta on each side and the females two, in other cases both sexes have two setæ.

In presenting this essay a little indulgence must be demanded. The group is one of the most difficult of the Carabide series, and can be properly studied by series of specimens and not by uniques, except they be typically selected. I must at this time again express my thanks to Mr. Ulke for kindly placing his entire material at my disposal, thereby more than doubling the number of individual specimens studied.

In accordance with the views expressed in the preceding pages, and by subordinating the characters in the manner indicated, it is proposed to divide our species into groups in the following manner:

- |   |                              |
|---|------------------------------|
| Mentum tooth more or less emarginate at tip (s. g. <i>Celia</i> ) .....   | 2.                           |
| Mentum tooth entire (s. g. <i>Acrodon</i> ).....  | 8.                           |
| 2.—Antennæ and legs piceous-black.....  | Group <i>erratica</i> .      |
| Antennæ pale, legs usually so.....  | 3.                           |
| 3.—Prosternum plurisetose at tip; prosternum of male not punctate (s. g. <i>Per-</i><br><i>cosia</i> ) .....                        | Group <i>obesa</i> .         |
| Prosternum either bisetose at tip or plain.....   | 4.                           |
| 4.—Prosternum of male with a group of small punctures or with a punctate<br>fovea.....  | 5.                           |
| Prosternum of male smooth, as in the female.....  | 7.                           |
| 5.—Prosternum of male with a rather large, but shallow fovea; sides of thorax<br>not deplanate: tip of prosternum without setæ..... | Group <i>californica</i> .   |
| Prosternum of male with an irregular group of small punctures.....  | 6.                           |
| 6.—Prosternum bisetose at tip; sides of prothorax distinctly deplanate.   |                              |
|   | Group <i>remotestriata</i> . |
| Prosternum without setæ; sides of prothorax not deplanate...Group <i>gibba</i> .  |                              |
| 7.—Prosternum without setæ; sides of prothorax not deplanate.   |                              |
|   | Group <i>musculus</i> .      |
| 8.—Prosternum of male smooth, the tip not setose; sides of prothorax not de-<br>planate .....                                       | Group <i>brunnea</i> .       |

#### Group *erratica*.

Antennæ pitchy-black, usually entirely so, often with the two basal joints rufescent. Legs piceous, or nearly black.

This group is the equivalent of the third, as defined by Zimmermann, and accepted in the various memoirs of subsequent authors. The two characters above given are the only ones peculiar to it. The head is smooth, the front very feebly impressed. Third joint of antennæ compresso-carinate at base. Thorax slightly emarginate in front, basal region not punctate, hind angles rectangular, but less sharply in *erratica*, the sides are not depressed. The elytral striæ

are fine, those of the outer side very faint; the ocellate punctures of the eighth stria do not form a continuous series, but are more or less interrupted in front of middle. The prosternum has a marginal line at apex, which is sometimes faint between the coxæ; there are no apical setæ.

One of the characters usually assigned to the group seems to have been overdrawn. There should be a punctured area on the prosternum of the male, but in the very many specimens examined it is rare to find anything but a faint indication of this character. For this reason I have found it advisable to deal with that character as one of secondary importance. In addition to the dilated front tarsi the males have but one setigerous puncture on each side of the apex of the last ventral segment, the females have two. In facies the species of this group resemble those of *Amara* proper, so that it is necessary to see a male in order to be certain of its position.

Three species are known to occur in our fauna, which may be separated in the following manner:

Thorax very distinctly twice as wide at base as long at middle.

Color black, dull in the female, a little more shining in the male.....**farceta**.

Thorax not twice as wide at base as long, general form more elongate.

Elytra with a silken lustre, intervals with more or less uneven surface, sometimes the intervals are alternately slightly more elevated; color very variable .....**interstitialis**.

Elytra shining, not visibly alutaceous, intervals flat, smooth and even.

**erratica**.

Of these species the first is alone peculiar to our fauna, *interstitialis* occurs also in Siberia, and *erratica* over many regions of Europe, especially in the North. The form of the third joint of the antennæ is a repetition of that found in a group of *Amara* proper to which the species of this group have the greatest resemblance.

**A. farceta** Lec --Oval, very like *confusa*, rather depressed, dull black ♀, the ♂ a little more shining and slightly bronzed. Antennæ piceous-black, with at most the first joint rufescent. Thorax rather more than twice as wide at base as long at middle, apex feebly emarginate, sides arcuate from a little in front of the base, hind angles rectangular, disc regularly convex, not depressed at sides, basal impressions feeble, the outer one oblique and more distinct, surface smooth, sometimes with a few obsolete punctures at middle of the base. Elytra finely striate, the striæ scarcely visibly punctate, intervals flat, extremely finely alutaceous. Body beneath black, shining, slightly bronzed or greenish, smooth. Legs black. Length .28--.36 inch.; 7--9 mm.

The scutellar stria is in most cases entire, but specimens are not rare with both ends of the stria free. The ocellate punctures of the

eighth stria form an interrupted series, leaving quite a long space free in front of the middle of the stria. In addition to the sexual characters common to the group, the males have the middle and posterior tibiæ slightly arcuate.

Occurs in Colorado, Utah, Wyoming, Nevada and California.

**A. interstitialis** Dej.—Oval, somewhat oblong, moderately convex, color variable, usually brownish bronze, sometimes bright green, cupreous or nearly black. Antennæ usually black, rarely with the first joint pale. Thorax less than twice as wide at base as long, not much narrowed in front, apex feebly emarginate, sides arcuate, hind angles rectangular, disc convex, with a feeble indication of lateral depression, basal depressions usually distinct, but feeble, the outer oblique, the inner short, linear, surface not punctate. Elytra finely striate, striæ very indistinctly punctate, intervals slightly convex, usually with undulating surface, the alternate intervals often slightly more elevated, surface very distinctly alutaceous, giving a silken lustre. Body beneath and legs piceous-black, surface smooth. Length .26—.40 inch.; 6.5—10 mm.

The scutellar stria is free at its posterior end in the vast majority of specimens, but occasional instances occur with the stria joining the first at the apical end. The ocellate punctures of the eighth stria have a wide interval between the basal and apical set of punctures. In the males the middle tibiæ are slightly bent rather than arcuate, and the posterior tibiæ are sinuate on the inner edge.

This species is very variable in form and color. The typical form is probably the dark bronze which occurs from Pennsylvania and New York, westward to Colorado, while the more brilliantly colored forms, the green and brassy, are more abundant about Hudson's Bay and the colder regions to the northward. The darker specimens are of the broader form, the brighter colored specimens being at the same time more elongate.

After a careful study of the descriptions of *patruelis* Dej. and *inaequalis* Kby., I am convinced that they refer to variations of the present species. The former is mentioned comparatively by Putzeys, but the characters suggested have no specific value whatever.

Extends from Nova Scotia westward, extending as far south as Pennsylvania in the Atlantic region and northern California on the Pacific. From both these extremes it extends northward to Hudson's Bay and to Alaska, crossing Behring Strait to Kamtschatka. Occurs in Europe also.

**A. erratica** Sturm.—Elongate oval, æneous, cupreous or nearly black, shining. Antennæ piceous-black, the two basal joints often red. Thorax not twice as wide at base as long at middle, sides arcuately narrowing to the front, apex moderately emarginate, hind angles rectangular, but not sharply so, disc moder-

ately convex, not depressed at the sides, near the base two depressions on each side, sometimes very feeble, the outer usually the smaller and obliquely placed, the surface rarely with very feeble punctures near the inner depression. Elytra finely striate, striae finely but distinctly punctured, the intervals either flat or slightly convex with even surface and not conspicuously alutaceous. Body beneath and legs piceous, the surface smooth and shining, often with slight æneous lustre. Length .24—.30 inch.; 6—7.5 mm.

The scutellar stria is usually entire, but specimens are not uncommon in which it is free at the posterior end. The series of ocellate punctures on the eighth stria is interrupted at middle. The middle and posterior tibiae of the male are slightly arcuate, that of the middle tibia the more distinct.

The variations of this species have been so often referred to by European students that it is hardly necessary to dilate on them at this time. The form described by Kirby as *levipennis* is founded on specimens of the larger size with shining surface.

This species has a distribution similar to *interstitialis* on our continent, although it does not come further south than Canada and Vermont.

It extends to Alaska, crossing to Asia, thence to Europe, where it occurs in all the higher latitudes, and in middle Europe in the mountainous regions.

#### Group *obesa*.

Antennae ferruginous or brown, legs rufo-piceous or darker. Prosternum with a well defined marginal line and plurisetose at apex.

This group is the equivalent of one of the sub-divisions of *Amara* called *Percosia* by Zimmermann, distinguished from *Celia* by having the dilated tarsal joints of the male broad and cordiform, while in *Celia* they are more elongate. There is certainly no appreciable difference in this respect between many *Celia* and *Percosia*. The sub-genus is, therefore, reduced to the grade of a group of *Celia* as Schaum did.

The series of ocellate punctures on the eighth stria is very nearly entire, that is, there is less of an interruption than is observed in many other species. The prosternum of the male is always absolutely smooth, without any trace of the small punctures. The middle and posterior tibiae of the male are very slightly arcuate.

Two species are known in our fauna belonging to this group.

Form oblong, not very convex; male shining, female opaque; metasternal episternum longer than wide at base.....***obesa*.**  
 Form short, robust and convex; both sexes shining; metasternal episternum short, the outer side shorter than the basal.....***fortis*.**



**A. obesa** Say.—Oblong oval, narrower in front, piceous-black shining, the elytra opaque in the female. Antennæ ferruginous or brownish. Head smooth, frontal impressions feeble. Thorax about one-half broader than the length, apex moderately emarginate, sides arcuate at apical half, then nearly parallel to base, hind angles rectangular, disc moderately convex, at sides slightly depressed, at base two depressions, the outer much deeper and apparently limited externally by a carina, basal region punctate, smoother at middle. Elytra striate, striæ more deeply impressed at apex, finely punctate, intervals slightly convex ♂, or flat ♀. Body beneath piceous-black shining, the sides of the two sterna and the first two ventral segments punctate. Legs piceous, or rufo-piceous. Length .36—.48 inch.; 9—12 mm.

The scutellar stria is entire. The ocellate punctures of the eighth stria form a nearly continuous series, being only more separated at middle. The marginal line of the apex of the prosternum is deep and furnished with numerous setigerous punctures, on each side numbering from four to six.

The posterior tibia of the male is nearly straight, the middle distinctly curved. The last ventral segment at apex has two setigerous punctures on each side, the same as the female.

In a large series of specimens variations of form will be observed. Sometimes the form is quite slender, not unlike some *Poecilus*, or the outline may be more oval and quite like *A. interstitialis*.

For a long time, beginning with Dejeau (Sp. iii, p. 502), this species has been considered identical with *patricia* of Europe, a view which has been successively adopted by Erichson, Schaum and LeConte. It was not until 1859 (Stett. Zeit. 1859, p. 130) that Chaudoir indicated that the punctuation of the sides of the sterna separated our species from *patricia*. Schaum states (Ins. Deutschl. i, p. 550) that in *patricia* the male has but one anal seta on each side; *obesa* has always two, and I have seen three. It is, however, stated by Thomson (Skand. Col. i, p. 241) that *patricia* has two setigerous punctures each side in both sexes.

*A. diffinis* Lec. is founded on several narrower specimens which do not differ in any important respect from *obesa*.

A very widely distributed species, New York, District of Columbia, Indiana, Michigan, Montana, Idaho, Hudson's Bay Territory, Colorado, Nebraska, Utah, Oregon, Washington.

**A. fortis** Lec.—Oval, robust, not narrowed in front, moderately convex, piceous, shining. Antennæ ferruginous. Head smooth, frontal impressions feeble, clypeus more or less longitudinally wrinkled. Thorax one-half wider at base than long, apex scarcely emarginate, sides arcuate, slightly narrowed toward base, hind angles rectangular, disc convex, the two basal depressions distinct

but shallow, the outer not so sharply defined externally as in *obesa*, basal region punctate, sides vaguely depressed. Elytra striate, striæ punctate, intervals slightly convex, smooth in both sexes. Body beneath rufo-piceous, the sides of the two sterna and the first ventral segment coarsely and rather deeply punctate; epipleuræ and legs paler than under side of body. Length .40--.46 inch.; 10--11.5 mm.

The scutellar stria is entire in all the specimens examined. The marginal line of the prosternum is distinct at the tip only, the setigerous punctures do not exceed four in number. The ocellate punctures of the eighth stria are small and form a nearly contiguous series.

In the male the middle and posterior tibiæ are very feebly arcuate. It is impossible to state the arrangement of the anal punctures. Three males have been examined, one has two anal punctures each side as in *obesa*, one other has but one puncture, while the third has two on one side and one on the other.

The characters given in the table will readily separate this species from *obesa*. In examining *obesa* it will be seen that the outer side of the metasternal episternum is longer than the side next the mesosternum, while in the present species the anterior side is slightly longer.

Collected at Waco, Texas, by Belfrage.

Group *californica*.

Antennæ ferruginous or pale brown, paler at base. Legs rufo-piceous. Males with an oblong shallow fovea at the middle of the prosternum, tip of prosternum without setæ.

This group is the equivalent of the fourth as adopted by Zimmermann and others, which I have attempted to define by characters more easily to be appreciated. By the previous definitions the anterior angles of the thorax are said to be not prominent, while in the *remotestriata* group they are supposed to be prominent.

One species occurs in our fauna.

**A. californica** Dej.—Oblong oval, narrower in front, piceous with dark bronze surface lustre, shining. Head smooth, frontal impressions moderately deep, usually broad, sometimes linear. Thorax nearly twice as wide at base as long, apex nearly truncate, sides arcuately narrowing from very near the base to the front, hind angles rectangular, disc moderately convex, sides not depressed, basal region with two impressions each side, the outer usually deeper, linear and oblique, the inner broader, sometimes with a few punctures, the middle of the basal region somewhat wrinkled. Elytra finely striate, striæ not punctured, intervals slightly convex. Body beneath piceous, with faint metallic lustre, surface smooth; epipleuræ and legs piceo-rufous. Length .26--.38 inch.; 6.5--9.5 mm.

The scutellar stria is long and well marked, attached at its basal end, but free at the other. The ocellate punctures of the eighth stria form a series broadly interrupted at middle. The marginal line of the prosternum is sometimes seen at the tip only, but specimens are frequent in which it is entire. The third joint of the antennæ is cylindrical at base.

The larger specimens have some resemblance to *insignis* of the true *Amara* series, and it is remarkable that the latter has a deep punctiform depression of the male prosternum.

In the male the middle tibia is very feebly arcuate, the posterior straight. The last ventral segment has one setigerous puncture each side, the female has two.

No great variation has been observed in this species, except in size. As a general rule the northern specimens are the smaller, while those from southern California or Arizona are much larger.

Occurs from Oregon southward through California into Arizona, extending into the Peninsula of California and the Guadalupe Islands. It also occurs in northern Mexico.

#### Group remotestriata.

Antennæ entirely rufo-testaceous. Legs usually pale, or with the femora piceous. Thorax with sharply defined rectangular hind angles, the disc vaguely depressed at the sides, more broadly posteriorly. Prosternum with a group of small punctures at middle in the male, the tip with two setigerous punctures.

This group is exactly equivalent to the fifth as defined by Zimmernann. It will be observed that the apex of the thorax is more deeply emarginate than in either *californica* or *gibba*, so that the angles of the thorax seem more prominent. The depression of the sides is not strongly marked, but is relatively nearly as great as in *obesa*. In the males of all the species there are two anal setæ each side as in the female, the pairs more closely approximated in the male.

The species are very closely related among themselves, but may be approximately separated by the following table:

Legs entirely rufo-testaceous; males more or less shining, females opaque.

#### **remotestriata.**

Femora piceous, tibiae and tarsi pale, species small, shining in both sexes.

#### **femoralis.**

**A. remotestriata** Dej.—Oblong oval, moderately convex, brownish or very slightly piceous, the males shining with faint bronze lustre, the females dull. Antennæ always rufo-testaceous. Head smooth, with faint frontal impressions. Thorax about one and a half times as wide at base as long at middle, apex emarginate, the angles slightly prominent to the front, sides arcuate, slightly wider at middle than at base, hind angles sharply rectangular, disc convex, with a feeble lateral depression, narrower in front, broader at base, basal region with two shallow depressions each side, the outer longer and somewhat triangular, the inner linear, the basal region sparsely punctate, often very feebly so. Elytra finely striate, striæ at most finely and feebly punctate, sometimes smooth, intervals flat in both sexes. Body beneath smooth and shining, the metathorax and abdomen darker in color; epipleuræ paler. Legs always pale rufo-testaceous. Length .26—.32 inch.; 6.5—8 mm.

The scutellar stria is long and usually entire. The ocellate punctures of the eighth stria form an interrupted series. The tip of the prosternum has a distinct marginal line and two punctures from which arise short setæ.

Zimmermann states that the sides of the metasternum are sparsely, but distinctly punctate. This may be observed in a few specimens, but is by no means evident. It more often happens that the sides of the first ventral segment have a few coarse punctures.

There is no species in the *Celia* series which seems to have been less understood than the present. In the series before me, which consists of more than fifty specimens about equally divided between Mr. Ulke's cabinet and my own, after a proper separation of the sexes and a thorough cleaning of the surface, it became at once evident by the different lustre of the sexes how several names have been given to them. The description given by Putzeys of *reducens* Mann. will be at once recognized as having been made from a male. The same fact is evident in the case of *terrestris* Lec., the remark made by LeConte that the striæ are deeper than in *remotestriata* is true, and is purely a sexual difference.

When the sexual differences dependent on surface lustre are understood there will not be observed any great variation in the species, except that arising from less maturity of the specimens.

As a rule, the specimens from the more northern regions of the species' habitat are larger in size.

*A. discors* Kby., is placed as a synonym of this species. At the time of his first examination of the type Dr. LeConte considered it *gibba* (Ann. Mag. Nat. Hist. London, 1870). On his return home he revised his notes (Proc. Acad. 1873, p. 324), and *discors* appears as a synonym of *chalcona*. Finally, in the LeConte cabinet is a speci-

men of *remotestriata* compared by Mr. Waterhouse, and by him labeled "very close to *A. discors* Kby." From the remarks of Kirby "elytra less glossy than the rest of the body, the infinitely minute and numerous granular reticulations of their substance being more conspicuous than usual," taken with Mr. Waterhouse's label seems to me to leave no doubt as to the identity of *discors*.

The distribution of this species is very extended. Starting from Alaska, it comes south through British Columbia, Washington and Oregon to northern California, and through Hudson's Bay Territory to Canada. In the Atlantic region I have seen it from New York and New Jersey. In the more western regions it is known from Wisconsin, Minnesota, Montana, Idaho, Colorado and New Mexico. Doubtless, it is found in the New England States, and as far as Labrador, but I have no specimens to indicate this nor any from the region westward of New York to Kansas.

**A. femoralis** n. sp.—Oblong oval, narrower than *remotestriata*, piceous, shining, surface distinctly bronzed. Antennæ pale brown, the basal joints paler. Head smooth, the frontal impressions rather broad and moderately deep. Thorax a little less than twice as wide at base as long, apex slightly emarginate, the anterior angles feebly prominent in front, sides arcuately narrowed at apical half, nearly parallel thence to base, hind angles rectangular, disc moderately convex, with the depression at sides quite evident, at base on each side two depressions, the inner rather larger, the surface along the base sparsely and indistinctly punctate. Elytra finely, but sharply striate, striæ not visibly punctate, intervals flat in both sexes. Body beneath piceous-black, shining. Femora piceous, tibiæ and tarsi rufo-testaceous. Length .20—.25 inch. ; 5—6.25 mm.

The scutellar stria is long and entire. The ocellate punctures of the eighth stria form an interrupted series. The prosternum has the marginal line at tip and two punctures with short setæ. The males, as in *remotestriata*, have the middle tibiæ slightly arcuate and the posterior feebly sinuate on the inner side.

This species is closely related to *remotestriata*, but the more elongate form; both sexes shining and the piceous femora will readily separate it.

This species was given me some years ago by Mr. Bowditch, who collected them on Mt. Lincoln and at Argentine Pass, at an elevation of 11,000 to 13,000 feet (3350 to 3970 metres).

#### Group *gibba*.

Antennæ and legs rufo-testaceous. Hind angles of thorax not sharply rectangular, the disc not deplanate at sides. Prosternum

with group of fine punctures in the male, sometimes very indistinct, the tip with marginal line, but without the setigerous punctures.

As far as known to me from the memoirs of Zimmermann and Putzeys, this group is peculiar to our fauna. The apex of the thorax is very feebly emarginate. The disc of the thorax is regularly convex, without trace of lateral depression, except feebly near the hind angles. As in the *remotestriata* series both sexes have two setigerous punctures on each side of the apex of the last ventral segment, except *robustula*.

Surface piceous or brownish, with, at most, but a feeble trace of metallic lustre; scutellar stria long, usually entire, never free at both extremities at the same time.

Form rather broadly oval, not twice as long as broad.

Legs rufo-testaceous; males with two anal setæ each side.....**chaleea**.

Legs piceous-black; males with but one seta each side.....**robustula**.

Form oblong, twice as long as broad.

Elytra as wide at base as the base of thorax; thorax not one-half wider than long; legs piceous-black.....**rectangula**.

Elytra wider at base than the base of thorax; thorax nearly twice as wide as long at its widest part.

Legs piceous; thorax scarcely narrowed in front.....**nupera**.

Legs rufo-testaceous; thorax distinctly narrowed in front.....**gibba**.

Surface very shining, rather brightly metallic, form and facies very like *aurata*; scutellar stria always much broken, imperfect and indistinct.**imitatrix**.

**A. chaleea** Dej.—Form rather more broadly oval than *remotestriata* and more convex, piceous, shining in both sexes, surface slightly bronzed. Antennæ pale. Head smooth, front with deep, but small frontal depressions. Thorax not twice as wide at base as long at middle, feebly narrowed in front, apex feebly emarginate, the angles not prominent to the front, sides arcuate nearly from the base, hind angles rectangular, disc convex without trace of depression at the sides, near the base on each side with two foveæ both rather large and deep, and coarsely punctured. Elytra finely, but sharply striate, the striæ not punctured, intervals flat in both sexes. Body beneath piceous-black, smooth, shining, usually with coarse punctures at the sides of the first segment. Length .26—.28 inch.; 6.5—7 mm.

The scutellar stria is long and entire; the ocellate punctures are somewhat interrupted at the middle of the eighth stria. At the tip of prosternum the marginal line is distinct and the setigerous punctures entirely wanting.

The middle and posterior tibiæ of the male have scarcely any trace of arcuation.

This species could only be mixed with *remotestriata*, than which it is broader and more convex, without lateral depression of the thorax and without setigerous punctures at the tip of the prosternum.

Systematically, the species has been unfortunate. By Zimmermann it was placed in his ninth group. Later it was considered to be a true *Amara*, and placed near *basillaris* by LeConte (Proc. Acad. 1855, p. 351). Putzeys restored it to its original position. It is evident that neither he nor Zimmermann ever carefully examined a male, or it would have been placed in the sixth group, which, for convenience, has been divided by me in the present essay.

Specimens are known to me from Massachusetts, New York, District of Columbia, North Carolina, Georgia, Texas, Michigan, Wisconsin, Nebraska and Colorado.

**A. robustula** n. sp.—Form rather broadly oval and robust, piceous-black, with slight greenish bronze surface lustre, legs piceous, the tibiæ and tarsi slightly paler. Antennæ brownish, paler at base. Head slightly wrinkled, the frontal impressions deep but short, a slight depression at middle of frontal suture. Thorax very nearly twice as wide at base as long at middle, slightly wider in front of base, very little narrowed in front, apex very feebly emarginate, sides regularly arcuate, hind angles rectangular, disc convex, without lateral depression, surface obsoletely punctate near apex, in front of the anterior transverse line, base bi-impressed each side, the inner impression larger, the entire basal region indistinctly punctate. Elytra a little wider at base than the base of the thorax, sides moderately broadly arcuate, moderately deeply striate, striæ punctate, intervals slightly convex, the surface minutely alutaceous. Body beneath piceous-black, smooth, shining. Length .30 inch.; 7.5 mm.

The scutellar stria is very long and deep, free at its apical end. The ocellate punctures are large and deep, the series widely interrupted at middle.

In the male the middle tibiæ are slightly arcuate, the posterior slightly sinuate on the inner side. The punctures of the prosternum are grouped in a shallow, oblong fovea.

This species is the most broadly oval of any known to me in the *Celia* series. The grouping of the prosternal punctures suggests that the species might be placed in the *californica* group, but the facies is so unlike that species and so much more closely resembling *chalcea*, that it is placed in this group.

From the fact that the male elytra are slightly alutaceous, it is probable that the female is more opaque.

Easily known from *chalcea*, which alone it in any way resembles, by its broader and more robust form, piceous legs and deeper and longer scutellar stria.

One male, California; locality unknown.

**A. rectangula** Lec.—Form oblong, parallel, recalling *Uloma* rather than *Amara*, piceous-black, shining. Antennæ pale or slightly brownish. Head smooth, with long, but feeble frontal impressions. Thorax scarcely a third wider at base than long, apex feebly emarginate, widest at middle, sides feebly arcuate from the base and slightly narrowed at apex, hind angles rectangular, disc convex, without lateral depression, basal fovea shallow, the outer slightly oblique and better marked, a few indistinct punctures along the basal region. Elytra not wider at base than the base of the thorax, sides feebly arcuate, disc finely and sharply striate, striæ not punctured, intervals slightly convex. Body beneath piceous-black, smooth and shining, the epipleuræ not paler. Legs entirely piceous. Length .28—.36 inch.; 7—9 mm.

The scutellar stria is long and well defined, usually entire, very rarely free at the posterior end. The series of ocellate punctures is interrupted at middle. In the male the middle and posterior tibiæ are arcuate, the former more distinctly.

The form of this insect is quite unlike the usual oval form of *Celia*, its parallel form recalling that of *Uloma*. The sides of the thorax are regularly arcuate from the hind angles, while in *gibba* they are oblique behind the middle. By measurement the thorax at base is scarcely a third wider than long at middle.

Occurs in Oregon and northern California.

**A. nupera** n. sp.—Oblong, not narrowed in front, piceous-black, shining, sometimes with a faint ænëous tinge. Antennæ usually pale, sometimes brown externally. Head smooth, frontal impressions small, oblique. Thorax three-fourths wider at base than long at middle, very little narrowed in front, widest at middle in front, oblique posteriorly, the hind angles sharply rectangular, basal region finely punctate, except at middle, and with two fovea each side somewhat variable in size, the outer always oblique, the inner more linear. Elytra a little wider at base than the base of the thorax, the disc finely but sharply striate, striæ finely obsoletely punctate near the base, intervals flat, or very feebly convex. Body beneath piceous-black, smooth and shining, epipleuræ paler. Legs piceous. Length .30—.36 inch.; 7.5—9 mm.

The scutellar stria is long and moderately deeply impressed, usually free at its posterior end, sometimes entire. The series of ocellate punctures on the eighth interval is widely interrupted at middle. In the male the middle tibiæ are slightly arcuate, the posterior feebly sinuate on the inner side.

This species is closely related to *rectangula*, but the latter has a much longer thorax, and the bases of thorax and elytra are equal in width, so that the form is more parallel.

Occurs in Colorado and New Mexico.

**A. gibba** Lec.—Oblong oval, distinctly narrower in front, brownish or nearly piceous, shining, a feeble trace of bronze lustre, legs always pale. Antennæ pale



rufo-testaceous. Head smooth, frontal impressions, moderately deep, straight and parallel. Thorax one and three-fourths times as wide at base as long at middle, slightly narrowed in front, apex very feebly emarginate, sides regularly arcuate, base very slightly narrowed, hind angles rectangular, but not sharply so, disc regularly convex, without trace of lateral depression, basal region with two impressions each side, the outer larger and deeper, the entire basal region usually punctate. Elytra distinctly wider at base than the thorax, sides arcuate, disc moderately deeply striate, stria finely, but distinctly punctate, intervals flat, slightly convex near the base. Body beneath darker in color than above, smooth and shining, usually a few coarse punctures at the sides of the first two ventral segments. Legs pale rufo-testaceous. Length .25—.30 inch.; 6.5—7.5 mm.

The scutellar stria is long, moderately deep and usually free at the posterior end. The ocellate punctures of the eighth stria are broadly interrupted at middle, the stria itself usually more deeply impressed at its extremities than usual in the genus.

This species is very closely related to *nupera*, but is always brownish in color and with pale legs. The form is narrower to the front, and consequently more oval than in that species. Immature specimens of *nupera* are not so easily separated, but a careful regard to the form will enable it to be done. The middle and posterior tibiae of the male are nearly straight.

Varieties occur in which the base of the thorax is scarcely punctate.

Putzeys suspected this species to be a variety of *remotestriata*, a view which I followed until the true limits of variation became known to me.

Occurs in Lake Superior region, Colorado, Arizona and southern California.

**A. imitatrix** n. sp.—Form moderately elongate, piceous, the surface with rather bright bronze lustre, resembling very closely *aurata*, legs always pale. Antennae pale or brownish, rarely almost piceous. Head smooth, frontal impressions short, deep, arcuate. Thorax less than twice as wide as long, widest a little behind the middle, slightly narrowed in front, apex feebly emarginate, sides regularly arcuate, hind angles rectangular, but slightly obtuse, disc regularly convex, without trace of lateral depression, base on each side feebly bi-impressed, the impressions punctate. Elytra distinctly wider at base than the base of the thorax, sides arcuate, disc finely but sharply striate, striae finely, not closely punctate, intervals flat. Body beneath piceous, with the tip of the abdomen rufo-testaceous, sometimes entirely rufo-testaceous. Legs always pale. Length .22—.28 inch.; 5.5—7 mm.

The scutellar stria is always indistinct and broken in short lengths, always free at both ends. The ocellate punctures are indistinct and separated by a wide space at middle. The middle and hind tibiae of the male are nearly straight.

The resemblance between this species and *aurata* is certainly very great. When males are examined the group of punctures of the prosternum will readily separate it. In either sex it will be observed that the hind angles are somewhat obtuse, while in *aurata* they are sharply rectangular. The thorax is also shorter in the present species.

Occurs in California, Washington and Vancouver.

Group *musculus*.

Antennæ and legs pale rufo-testaceous. Prosternum of male without group of punctures, the tip with a marginal line, but without setæ.

In this group it is proposed to unite the species separated by Zimmermann in his eighth and ninth groups, the distinction between the two being that the former has the thorax square, the latter narrowed in front. This distinction is so purely specific, and among our species not readily appreciable, that for convenience it is thought better to treat the groups as one.

The males have the anterior tarsi dilated in the usual manner and the last ventral segment one marginal seta each side, the females have two.

In none of the species are the sides at all deplanate, resembling in this respect the *gibba* group. One species only has a decided metallic lustre, the tendency being rather to castaneous or piceo-testaceous. The species are not difficult to separate by comparison, but more troublesome to distinguish by description.

The following table will be of assistance :

Surface shining, rather conspicuously metallic.

Striæ not punctate; frontal impressions distinct..... ***aurata***.

Surface piceous to rufo-testaceous, without any well marked surface lustre.

Sides of thorax oblique behind the middle, hind angles sharply rectangular; scutellar stria united at base with the second and at its apex with the first stria..... ***harpalina***.

Sides of thorax not oblique behind the middle, usually arcuate from the hind angles; scutellar stria always free at its apical extremity.

Thorax distinctly emarginate at apex, the angles sharply prominent to the front, hind angles rectangular; elytral striæ punctulate.. ***subænea***.

Thorax almost truncate at apex, anterior angles very obtuse.

Elytral striæ distinctly punctulate.

Form more oblong, hind angles of thorax much rounded; metasternum at sides and metepisterna coarsely punctate..... ***rubrica***.

Form more oval, hind angles subrectangular or obtuse, not rounded; metasternum and metepisterna smooth..... ***musculus***.

Elytral striæ not punctulate; metasternum and metepisterna smooth. ***texana***.

**A. aurata** Dej.—Oblong, moderately elongate, piceous, surface bronzed shining. Antennæ pale brown, three basal joints paler. Head smooth, frontal impressions deep, but short. Thorax about half wider at base than long, slightly narrowed in front, apex scarcely at all emarginate, sides arcuate in front, nearly parallel behind, hind angles sharply rectangular, disc convex, with two basal impressions each side, the inner larger, the basal region usually more or less punctate, sometimes smooth. Elytra slightly wider at base than the base of the thorax, finely sharply striate, striæ not punctate, intervals flat. Body beneath piceous-black shining, the abdomen usually slightly castaneous. Legs rufo-testaceous or slightly piceous. Length .24—30 inch.; 6—7.5 mm.

The scutellar stria is usually long, free at its apical end, sometimes it is feeble and interrupted. The series of ocellate punctures of the eighth stria is widely interrupted at middle.

This species resembles *scitula* and *longula* of the *Triæna* series, but may be at once known by the form of the terminal spur of the front tibia. The resemblance to *imitatrix* of the preceding group is even greater, but apart from the smooth sternum of the male *aurata* it also differs in the form of the hind angles, which are always sharply rectangular.

Occurs in the Pacific region from British Columbia southward to San Diego, Cal.

**A. harpalina** Lec.—Form oblong, rufo-piceous or brownish, moderately shining. Antennæ rufo-testaceous. Head smooth, with feeble frontal impressions. Thorax less than twice as wide at middle as long, slightly narrowed in front, apex feebly emarginate, the angles not prominent, sides arcuate in front, straight and oblique at basal half, hind angles sharply rectangular, basal region vaguely bi-impressed each side, the entire basal region punctate, especially near the angles. Elytra slightly wider at base than the base of the thorax, disc moderately deeply striate, the striæ finely crenately punctured, intervals convex. Body beneath usually paler than above; sides of metasternum, the episterna very coarsely and closely punctate, sides of first three ventral segments more sparsely punctate. Legs rufo-testaceous. Length .25—.28 inch.; 6.25—7 mm.

The scutellar stria is long and entire, arising at the base of the second stria and joining the first stria posteriorly. The series of ocellate punctures is interrupted at middle.

The males of this species have a more shining surface, the female elytra are subopaque.

The authors who have dealt with this species seem to have overlooked the very coarse punctures of the under side of the body.

Occurs in Utah and New Mexico, near Santa Fé.

**A. subænea** Lec.—Form oblong-oval, narrowed in front, piceous, with faint bronzed surface, shining. Antennæ rufo-testaceous. Head smooth, front with short, linear, slightly oblique impressions. Thorax about one-half wider at base

than long at middle, distinctly narrowed at apex, moderately deeply emarginate, the angles distinctly prominent to the front, sides regularly arcuate, hind angles rectangular, disc moderately convex, with two moderately deep, coarsely punctured impressions on each side, the inner larger. Elytra not wider at base than the base of the thorax, moderately deeply striate, striæ finely crenately punctured, intervals convex. Body beneath usually paler than above; sides of metasternum and first two ventral segments with a few coarse punctures. Length .20—.28 inch.; 5—7 mm.

The scutellar stria is always long and deeply impressed and free at its apical end. The ocellate punctures are interrupted at the middle of their extent.

In this species both sexes have a shining surface.

From all the species of this group the present may be known by the very distinctly emarginate apex of the thorax with the angles prominent to the front.

A recent examination of the type shows that *pallidula* Cas. is really a very immature specimen of this species and not of *rubrica*.

Occurs in the Lake Sup. region, and in Nebraska and Colorado.

**A. rubrica** Hald.—Oblong, moderately convex, rufo-testaceous to castaneous, shining in both sexes. Antennæ pale. Head smooth, frontal impressions feeble and indistinct. Thorax not twice as wide as long, very little narrowed in front, apex very feebly emarginate, sides regularly arcuate, hind angles usually very obtuse, disc convex, the basal impression very feeble, usually punctured, sometimes entirely smooth. Elytra very little wider at base than the thorax, moderately deeply striate, striæ finely crenately punctured, intervals convex. Body beneath paler than above; side of metasternum and the met-episterna with coarse punctures. Ventral segments coarsely sparsely punctate at the sides of the first four segments; legs pale rufo-testaceous. Length .23—.28 inch.; 6—7 mm.

The scutellar stria is long and deep, free at its apical end. The series of ocellate punctures is interrupted at middle.

The punctuation in the basal region of the thorax is more variable in this species than any of the group. Those with the smooth base of the thorax bear such a remarkable resemblance to less mature forms of *Harpalus nitidulus* that they might readily be confused. The striæ are rather more strongly crenate than in any other of the group. The sculpture of the underside of the body will separate from *musculus*, the only one which might be mixed with it.

Occurs from the Middle States region to Texas and Colorado.

**A. musculus** Say.—Oblong oval, rufo-piceous, or piceous and shining, sometimes a faint æneous surface lustre. Antennæ pale. Head smooth, frontal impressions almost entirely obliterated. Thorax rather more than half wider than long, distinctly narrowed in front, apex very feebly emarginate, sides arcuate, hind angles usually obtuse, sometimes subrectangular, disc convex, the basal de-

pressions almost obliterated, the surface near the hind angles sparsely indistinctly punctate, or entirely smooth. Elytra not wider at base than the thorax, moderately deeply striate, striæ finely crenately punctured, intervals slightly convex. Body beneath similar to color above, except that the abdomen is usually paler; sides of metasternum and the episterna smooth, a few punctures at the sides of the first ventral segment. Legs rufo-testaceous. Length .20—.22 inch.; 5—5.5 mm.

The scutellar stria is short, deeply impressed, free at its apical end. The ocellate punctures of the eighth stria usually form a continuous series without any interruption, although they are more distant from each other in the middle of the series.

In both sexes of this species the elytra are equally shining. The striæ vary in the distinctness of the punctuation, as remarked by Dr. LeConte, but the punctures may always be seen.

Putzeys remarks (Mem. Liege 1866, p. 186) that there are no species of *Celia* with an ocellate puncture at the base of the scutellar stria except *musculus* and three others which he names. I have examined many *musculus* and find no trace of such a structure, nor is it mentioned by Putzeys later in the paper, where there is an excellent chance to refer to it.

Occurs in Pennsylvania, Ohio, Illinois, District of Columbia, North Carolina, Wisconsin, Nebraska and Arizona.

**A. texana** Putz.—Similar in form to *musculus*, color piceous, faintly æneous. Antennæ pale. Head smooth, frontal impressions short, well defined, and slightly convergent. Thorax similar in form to *musculus*, but a little longer, hind angles more distinct. Elytra as in *musculus*, the striæ sharply defined, moderately deep, without trace of punctures, intervals very feebly convex. Body beneath as in *musculus*, the sides of metasternum and abdomen smooth. Legs rufo-testaceous. Length .20—.24 inch.; 5—6 mm.

The scutellar stria is well marked, rather long, free at its apex. The series of ocellate punctures is widely interrupted at middle.

This species is very closely related to *musculus*, but the absence of punctures in the striæ will distinguish it. The females are a little less shining than the males. As a rule the base of the thorax is more punctate than in *musculus*, but specimens occur quite smooth as in that species.

Occurs in western Texas near the Rio Grande.

#### Group *brunnea*.

Antennæ and legs pale; sides of prothorax not deplanate, prosternum smooth in the male, the tip not setose. Mentum tooth acute at tip; scutellar stria long and entire.

This group corresponds with the gubgenus *Acrodon* of Zimmer-

mann, and those who follow his system. As a division of any rank it is now dropped by all students, and considered merely a group of *Celia*. In fact, it is not easy to separate it from the *musculus* group, as the mentum tooth is by no means easy to see at all times.

The only species is

**A. brunnea** Gyll.—Piceous or brown, with faint bronze lustre, oblong, parallel. Head smooth, antennæ entirely pale. Thorax about one-third wider at base than long, slightly narrowed in front, sides feebly arcuate, hind angles rectangular, apex slightly emarginate, disc moderately convex, smooth, coarsely punctured along the base and with two basal depressions, the outer deeper and limited externally by an obtuse carina. Elytra striate, striæ finely and distantly punctured, intervals slightly convex. Body beneath smooth and shining; legs rufo-testaceous. Length .24—.28 inch.; 6—7 mm.

In this species the scutellar stria is moderately long, but usually free at tip. The form is rather more parallel than in any of our *Celia*.

Both sexes are equally shining. The male has one and the female two anal setæ each side.

Occurs from Alaska southward to Washington, and also to Colorado. It is not rare in northern Europe.

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*patruelis* Dej., Spec. gen. v, p. 793; Putz., loc. cit. p. 188.  
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### Random Studies in North American Coleoptera.

BY GEO. H. HORN, M. D.

The following notes have been prepared with the view of making known to others some facts in synonymy which have become known to me in various ways, and incidentally to describe a few new species belonging to groups which have been too recently monographed to require an entirely new study.

#### PTEROSTICHUS Bon.

##### *P. amethystinus* Dej.

In the male of this species the posterior femora are thickened near the tip with a very obtuse angulation beneath. The trochanter is about half as long as the femur. The femur of the female is not dilated, and the trochanter much shorter. The scutellar stria is never long, and in some specimens nearly wanting.